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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/439,225	11/12/1999	CARLOS SALDANHA	1162.007US1	1407

21186 7590 08/21/2007
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ART UNIT	**PAPER NUMBER**
2628	

MAIL DATE	DELIVERY MODE
08/21/2007	PAPER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/439,225
Filing Date: November 12, 1999
Appellant(s): SALDANHA ET AL.

J. Kevin Parker
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/23/2007 appealing from the Office action mailed 9/7/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,310,627	Sakaguchi	10-2001
6,404,428	Weaver	06-2002

Pascal Volino, Nadia Magnenat Thalmann, Shen Jianhua, D. Thalmann, "The Evolution of a 3D System for Simulating Deformable Clothes on Virtual Actors", MIRALab 1998.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi U.S. Patent No. 6,310,627 (hereinafter Sakaguchi) in view of Pascal Volino, Nadia Magnenat Thalmann, Shen Jianhua, D. Thalmann, "The Evolution of a 3D System for Simulating Deformable Clothes on Virtual Actors", MIRALab 1998 (hereinafter Volino) and Weaver U.S. Patent No. 6,404,426 (hereinafter Weaver).

Re claims 1 and 38, Sakaguchi teaches a method for producing an image of a computer-simulated mannequin wearing a garment as defined by selected mannequin and garment parameter values, comprising generating objects corresponding to a representative mannequin and a garment placed in a simulation scene within a three-dimensional modeling environment (*e.g., col. 30, lines 57 to col. 33, lines 38 and Fig. 34*), simulating draping and

collision of the garment with the representative mannequin within the simulation scene to generate a three-dimensional rendering frame of the representative mannequin wearing the garment (*e.g., col. 30, lines 57 to col. 33, lines 38 and Fig. 34),* constraining portions of the garment to reside within or outside of one or more shells *(Fig. 34, the shells are interpreted in light of applicant's specification, see applicant's drawing in Fig. 8A and Fig. 6 wherein Fig. 8A and 6 defined 2D shells, the cited reference discloses shells in the form of the 2D patterns D" surrounding the 2D projection of the mannequin or the human model. Even if the shells are 3D regions around the mannequin or the human model, the cited reference discloses shells in the form of the 3D patterns D' surrounding the mannequin or the human model M'; See column 24-25 wherein the first projection function T in which the positional relationship between the lattice points ci and ai may be represented by vector distances therebetween and the second projection function in which the lattice points ai and ai' may be represented by vector distances therebetween; and the garment C' is related to M' by the first projection function; see column 22. The cited reference teaches constraining portions of the garment C' such as the patterns D' to reside within or outside the one or more shells or the planar regions enclosed by the lattice points ci' defined with a distance from the lattice point ai' from the mannequin M' or the figure model M'*) defined around the representative mannequin in the rendering frame during the draping and collision simulation (*The draping and collision simulation is disclosed in Fig. 34 and column 29, lines 1-10 wherein drapes and wrinkles of the garment are simulated if the images are animated. The shape of the garment as fitted into the shape of the human model; see e.g., col. 25, lines 1-67; col. 30, lines 24-65; See column 7, lines 30-41 wherein the cited reference teaches arranging the patterns D in specified positions around the human model M*

and calculating the collisions of the patterns D with the human model M. See column 8, lines 30-35 wherein the cited reference discloses a range defined by a maximum moving distance of the human model M per unit time with a margin; the triangular patches of the human model M corresponding to the respective lattice points are detected and the coordinates of the respective lattice points of the patterns D are moved according to the moving distances of the corresponding triangular patches of the human model M during the unit time), wherein each shell is a three-dimensional construct (*Figs. 23-24) designed to mimic the physical interaction of the garment with another garment (See Fig. 34 wherein the human model Mst and the garment Cst are both shells defined around the mannequin and Fig. 34 also shows the draping and collision effect wherein the physical interaction of the garment of the first image frame with another garment of the second image frame has been demonstrated in the animation simulation and the deformation in the garment Cst caused by the collision of the garment Cst and the human model Mst is simulated. Moreover, each garment Cst includes a plurality of garments or garment patterns of Fig. 2 wherein each garment includes a skirt garment, a front body garment etc, or a dress garment includes a pant garment and a coat garment. See also Fig. 11A-11C wherein Fig. 11A shows a human body wearing clothes and Fig. 11c shows putting another layer of garments to the human body of Fig. 11A. See column 7, lines 30-50 wherein the collisions of the patterns D with the human model M and the collisions of the patterns D themselves (the pattern images included in the patterns D shells) are detected/simulated*), and

Rendering a two-dimensional image of the garment (*See column 23, lines 60-67 wherein the 2D images of a plurality of patterns D' of the special garment C' are disclosed and column 27, lines 65-67 wherein 2D images of the patterns D" for the special garment C' are disclosed*

and column 23, lines 38-55 discloses an external storage device 45, i.e., a repository, for storing a plurality of the 2D pattern images of the garment; see column 27, lines 60-67 wherein the 2D images of the patterns are renewably displayed in the display device 62) from the rendering frame and layering the rendered garment image upon a two-dimensional image of a selected mannequin (*e.g., Fig. 34, col. 31, lines 21-55 wherein the garment images and the human body image are rendered/displayed in a two-dimensional display screen wherein the garment image is layered over the human body image selected from a plurality of human body images; see column 27, lines 60-67 wherein the 2D images of the patterns are renewably displayed as a composite image in the display device 62; see also column 23, lines 1-10 wherein the transformation functions are applied to render a two-dimensional composite frame in a two-dimensional display device and subsequently both the garment patterns and the human figure model have been transformed into the two-dimensional images in a composite image. Sakaguchi teaches in column 32, lines 10-20 the Z-buffer method for successively outputs the image data (in layers) to the display device 76 (See also Fig. 4 wherein patterns/shells D surround the mannequin M*).

In other words, Sakaguchi teaches displaying a system and method for representing a stereoscopic shape of a garment when the garment is put on a three-dimensional object such as a person's figure. The system and method comprise generating a 3D object model corresponding to the person's figure; inputting information on the person's figure and a try-on garment; arranging the respective patterns of the garment in corresponding portions of the 3D object model, three-dimensionally deforming the respective patterns by calculating collision deformations when the respective patterns are pressed against the corresponding portions based on the information on the garment, and generating a stereoscopic image of the garment by

connecting the respective deformed 3D patterns based on the information on the garment. Moreover, Sakaguchi teaches rendering the garment animation frames on the three-dimensional character images and simulating a deformation in the garment caused by the collision of the human model and the garment when the human model is moved (column 31, lines 21 to column 33, line 38). The collision and animation of the garment with respect to the human model correspond to the draping and collision of the garment with the mannequin wherein the patterns and deformation parameters affects the draping and collision of the garment with the human model.

However, It needs to be shown whether Sakaguchi expressly teaches the claim limitation of "wherein each shell is a three-dimensional construct designed to mimic the physical interaction of the garment with another garment" and "rendering a two-dimensional image of the garment from the rendering frame and layering the rendered garment image upon a two-dimensional image of a selected mannequin".

Sakaguchi further discloses in Fig. 4 shells D surrounding the mannequin M. Sakaguchi discloses at column 21, lines 35-63 the pattern preparing system 40 for generating a plurality of patterns and for deforming the 3D image of the standard figure to generate an individual figure model and for generating a plurality of patterns for the garment fitted on the human model. Sakaguchi discloses constraining the lattice points defining the garment with a vector distance from the lattice points forming the triangle patches of the mannequin in the rendering frame. See column 24-25 wherein the first projection function T in which the positional relationship between the lattice points ci and ai may be represented by <u>vector distances</u> therebetween and the second projection function in which the lattice points ai and ai' may be represented by vector

distances therebetween; and the garment C' is related to M' by the first projection function; see column 22. The cited reference teaches constraining portions of the garment C to reside within or outside the one or more triangle patches enclosed by the lattice points ci defined with a distance from the lattice point ai from the mannequin M or the figure model M.

Sakaguchi also teaches constraining portions of the garment C' to reside within or outside the one or more shells or the triangle patches enclosed by the lattice points ci' defined with a distance from the lattice point ai' from the mannequin M' or the figure model M'.

Therefore, Sakaguchi at least suggests the claim limitation of "the shell defined around the mannequin" because Sakaguchi discloses the shape of the garment (as broken into triangle patches) as fitted into the shape of the human model (col. 25, lines 1-67; col. 30, lines 24-65) wherein the shape of the garment are defined by the triangle patches within the shells D around the mannequin M.

Volino discloses, *inter alia*, the claim limitation wherein each shell is a three-dimensional construct (the shell can be visualized in Volino Fig. 10) designed to mimic the physical interaction of the garment with another garment (Page 14) and rendering a two-dimensional image of the garment from the rendering frame and layering the rendered garment image upon a two-dimensional image of a selected mannequin (Page 14).

For example, Volino discloses in Page 10 and Page 17-18 the creation of the human models or the body representations. Volino discloses in Page 14 the garment design and simulation process wherein clothes are animated as deformable objects by assembling 2D panels wherein the garment models are designed as flat fabric panels using a 2D drawing software. The garment panels are used in the 3D simulation process wherein the animation will take place

using mechanical simulation and then continuing the simulation on the animated scene and characters and the scene may contain several objects, static or animated, that will interact with the GARMENTS through collision. Volino teaches that garments are loaded from a file containing the description of the 2D panels and the panels are discretized into triangle meshes and then interactively placed in an initial position that is suitable for seaming. When dressing the actor, the initial position is around the actor body. Then, using mechanical simulation, the panels are pulled together along the seaming lines using "elastics" which are attachment forces that pull together the corresponding vertices of both panels along the seaming line. Once the seaming lines are close enough, they are topologically merged, and the set of panels becomes one unique object.

Volino discloses complex dressings containing several garments are animated concurrently by the program. Full interaction is provided by collision detection and optimization for multilayer animated objects provides stability of the overall system. Incremental collision detection is also used when relative movements are slow enough.

Volino further discloses in Page 14 that the animated garments are finally recorded frame by frame as animations allowing incremental garment design for complex cloth.

Volino discloses generating objects corresponding to a representative mannequin (e.g., Page 10-11) and a garment placed in a simulation scene within a three-dimensional modeling environment (e.g., Page 14); simulating draping and collision (e.g., self-collision, crumpling to the ground of Page 5, stretching and bending deformations of Page 9; bending and wrinkling of Page 8, etc) of the garment with the representative mannequin (Fig. 10) within the simulation scene to generate a three-dimensional rendering frame of the representative mannequin wearing

the garment (Page 14; Page 8 also discloses the output is a collection of frames of the computed animation; see Fig. 4); constraining portions of the garment to reside within or outside of one or more shells defined around the representative mannequin in the rendering frame (Fig. 10 and Page 8 discloses simulating several garments concurrently with reasonable computation time and numerous and interacting collisions resulting from crumpling or multilayer cloth handled efficiently and robustly wherein the simulation involves the constraints and the collision detection algorithm builds a geometrical surface region hierarchy and takes advantage of surface curvature within and between adjacent surface regions wherein the surface regions around the human model forms the outside shells defined around the representative mannequin as shown in Fig. 10; see Page 9; in Page 14, the 2D panels for the garment models such as flat fabric panels are defined around the representative mannequin or the human model; when dressing an actor, the triangle meshes *are the image mesh objects that are placed around the actor body*).

It would have been obvious to one of the ordinary skill in the art to have incorporated Volino's teaching into Sakaguchi's method for producing an image of a computer-simulated mannequin because simulating layers of garments or garment panels are old and well known as taught in Volino. Moreover, Sakaguchi enables simulation and calculation of the collisional deformations when the respective patterns are pressed against the corresponding portions based on the information on the garment (Sakaguci column 31, lines 21 to column 33, line 38) and thereby at least disclosing the interaction among the garment patterns (garment panels).

One of the ordinary skill in the art would have been motivated to simulate/animate complex dressings containing several garments to provide full interaction by collision detection and optimization for multilayer animated objects and thereby providing stability of the overall

system (Volino Page 14) and to simulate/animate the complex dressing combinations such as a skirt and blouse combination wherein interaction between the skirt and blouse combination is simulated/animated (See Weaver column 5, lines 60-67).

Re claims 2, 35, and 43, Sakaguchi discloses the rendered image is used to form a visual image on a computer display device (col. 27, lines 25-67; column 31, lines 21-55; column 33, lines 25-38). Sakaguchi teaches rendering the garment animation images on the character images and simulating a deformation in the garment in a three-dimensional simulation scene wherein the animation involves a 3D human model wearing a garment from the external storage device and the scene is rendered frame by frame and thereby simulating the wearing style of the human model as the scene is rendered. Referring to the claim 35, Weaver further discloses in column 5, lines 6067 that the garment images contained in the repository include images of different versions of garments (small, medium or large or skirt and blouse, etc.) wherein different versions of a particular garment are combinable with specific other garments.

Re claims 3-4, 6-9, 13, 30-31, 33, and 36, Sakaguchi discloses generating rendering frames containing mannequin or garment objects as defined by selected parameter values by shape blending corresponding objects of previously generated rendering frames (column 25, lines 1-67; column 31, lines 21 to column 33, line 38). Shape blending refers to a technique used to change mannequin or garment dimensions by changing the dimension parameters in a previously generated rendering frame. However, Sakaguchi discloses changing the deformation parameters (a specific movement of the human model such as a leg or a hand gesture is moved

and a selected number of parameters such as size information including height, shoulder, width, chest size associated with the selected body part is inputted via the input device to generate 3D animation images in which the human model moves in a specific manner; column 30, lines 37-65) of the garment in response to the change in dimensions of the human model and thereby simulating a corresponding frame of the animation image of the garment and thus simulating a deformation in the garment caused by the collision of the human model and the garment when the human model is moved (column 31, lines 21 to column 33, line 38). Volino further discloses in Page 14 storing the rendered garment image in a repository for containing a plurality of two-dimensional garment images (Volino discloses that garments are loaded from a file containing the description of the 2D panels). Volino further discloses the claim limitation set forth in the claim 7 of generating multiple rendering frames for a plurality of different garments and layering a plurality of two-dimensional image of the different garments upon the selected mannequin. Volino discloses in Page 14 complex dressings containing several garments are animated concurrently by the program. Full interaction is provided by collision detection and optimization for multilayer animated objects provides stability of the overall system. Incremental collision detection is also used when relative movements are slow enough.

Volino further discloses in Page 14 that the animated garments are finally recorded frame by frame as animations allowing incremental garment design for complex cloth.

Re claims 5, 23, 42 and 45, Sakaguchi discloses the two-dimensional images are rendered from a rendering frame using a plurality of camera positions (column 25, lines 42-67; column 26, lines 1-42; col. 27, lines 54-67). Applicant admits that the camera referred to herein is not a real

camera and refers only to a viewing position for rendering the image from the three-dimensional rendering frame. However, Sakaguchi teaches digitizing a three-dimensional image so that the 2D images of the garment patterns are generated with respect to a reference line or a viewpoint position. **Sakaguch further teaches *photographing a 3D model in motion along time axis at suitable angles* and under suitable lighting and the movements of the person in the three-dimensional virtual environment can be stereoscopically viewed from a variety of angles** (column 29, lines 30-36).

Re claims 10-12 and 39, Sakaguchi discloses the separate rendering frames are combined into a composite two-dimensional image using Z-coordinates of the objects (col. 32, lines 7-16; col. 30, lines 37-65). First of all, Sakaguchi discloses combining the garment animation image and the human animation image (column 30, lines 37-67 to col. 31, lines 1-10). Sakaguchi further discloses the z coordinates in the Z buffer method for combining a plurality of patterns or frames to form a two-dimensional image (column 25, lines 42-67; column 26, lines 1-42; col. 27, lines 54-67; column 29, lines 30-36). **Sakaguchi teaches comparing (z coordinates of) the lattice points of the human model and the garment to generate a two-dimensional image** (col. 25, lines 1-67).

Re claims 14-15, Sakaguchi discloses a network and a processor-executable instructions (col. 27, lines 54-67).

Re claims 16, 19, 29, and 32, the limitations of claims 16, 19, 29, and 32 are analyzed as discussed with respect to claim 1 above except for generating rendering frames containing mannequin or garment objects as defined by selected parameter values by shape blending corresponding objects of previously generated rendering frames. Shape blending refers to a

technique used to change mannequin or garment dimensions by changing the dimension parameters in a previously generated rendering frame.

However, Sakaguchi discloses changing the deformation parameters (a specific movement of the human model such as a leg or a hand gesture is moved and a selected number of parameters such as size information including height, shoulder, width, chest size associated with the selected body part is inputted via the input device to generate 3D animation images in which the human model moves in a specific manner; column 30, lines 37-65) of the garment in response to the change in dimensions of the human model and thereby simulating a corresponding frame of the animation image of the garment and thus simulating a deformation in the garment caused by the collision of the human model and the garment when the human model is moved (column 31, lines 21 to column 33, line 38). Sakaguchi discloses a shaping blending (column 30, lines 45-65) wherein a stereoscopic image of the garment put on the human model is simulated in which the 3D animation images representing the movement characteristics (shape change) of the garment by combining (blending) the garment animation image and the human animation image. Sakaguchi discloses calculating the collision of the human model and the garment to thereby calculate a 3D image in which the state of the garment changes more realistically and the change image is calculated for the respective parts, i.e., hands, legs, trunk of the human model (column 32, lines 40-65).

Volino also discloses the claim limitation of generating a second rendering frame containing a second mannequin (Page 10) and a second garment (Page 14) as defined by selected parameter values that specify different dimensions from the first mannequin and/or first garment

(Page 15-16 wherein the parameter settings can be changed by the user through the user interface and Page 11 discloses the parameters for setting the different dimensions of the mannequin) by shape blending (Page 10-11) corresponding objects of the first rendering frame, wherein the shape blending is performed by linearly combining parameters of the first rendering frame and performing a partial draping and collision simulation (e.g., modeling and animating complex organic shapes at a fraction of the data points cost compared to more common patching techniques and the final object is constructed by blending the primitives and as the primitives are moved and deformed the resulting blended surface changes shape; see Page 10-11).

Re claims 17-18, 20-22, 24-28, 37, and 40-41, Sakaguchi discloses a plurality of garment patterns that are connected together during the draping and collision simulation and further wherein the garment parameters including the normal lines of the surface of the garment (col. 31, lines 55-67). Referring to the claim 18 and 24, Sakaguchi further discloses wearing multiple garments from the garment animation image generator around the 3D images of the human model and defining parts of the human image model and garments so that the deformation in the garment caused by the collision of the garment and the human model is simulated (column 32, lines 8-65). Referring to the claim 20, Sakaguchi discloses that patterns for the garment images are combinable along the outside surface of the human model into the composite animated image. In column 21, lines 35-63, Sakaguchi further discloses the pattern preparing system 40 for generating a plurality of patterns and for deforming the 3D image of the standard figure to generate an individual figure model and for generating a plurality of patterns for the garment fitted on the human model. Sakaguchi also discloses constraining the garment to reside outside

of the triangle patches of the human model defined around the mannequin in the rendering frame. Referring to the claim 21, shape blending refers to a technique used to change mannequin or garment dimensions by changing the dimension parameters in a previously generated rendering frame. However, Sakaguchi discloses changing the deformation parameters (a specific movement of the human model such as a leg or a hand gesture is moved and a selected number of parameters such as size information including height, shoulder, width, chest size associated with the selected body part is inputted via the input device to generate 3D animation images in which the human model moves in a specific manner; column 30, lines 37-65) of the garment in response to the change in dimensions of the human model and thereby simulating a corresponding frame of the animation image of the garment and thus simulating a deformation in the garment caused by the collision of the human model and the garment when the human model is moved (column 31, lines 21 to column 33, line 38). Referring to the claim 22, Sakaguchi teaches mapping the pieces of information on the shape, material, color, pattern and the like of the desired garment for this garment before the 2D images of the patterns for the special garment is rendered.

Referring to the claims 26 and 40-41, Sakaguchi discloses changing the deformation parameters (a specific movement of the human model such as a leg or a hand gesture is moved and a selected number of parameters such as size information including height, shoulder, width, chest size associated with the selected body part is inputted via the input device to generate 3D animation images in which the human model moves in a specific manner; column 30, lines 37-65) of the garment in response to the change in dimensions of the human model and thereby simulating a corresponding frame of the animation image of the garment and thus simulating a

deformation in the garment caused by the collision of the human model and the garment when the human model is moved (column 31, lines 21 to column 33, line 38). Referring to the claim 27, a different version of the animated image of the human model and a different version of the animated image of the garment are rendered frame by frame wherein the image of the garment is fitted to the image of the human model in a 3D space. Referring to the claim 28, Sakaguchi discloses the rendered image is used to form a visual image on a computer display device (col. 27, lines 25-67; column 31, lines 21-55; column 33, lines 25-38). Sakaguchi teaches rendering the garment animation images on the character images and simulating a deformation in the garment in a three-dimensional simulation scene wherein the animation involves a 3D human model wearing a garment from the external storage device and the scene is rendered frame by frame and **thereby simulating the wearing style of the human model as the scene is rendered**.

Re claim 34, the limitations of claim 34 are analyzed as discussed with respect to claim 1 above except for a user interface and a repository. Sakaguchi teaches the claimed limitation (col. 31, lines 20-55) when he discloses inputting the kind of the shape of the garment such as a dress or a two-piece suit and inputting the motion data from the motion data input device. As for a repository, Sakaguchi further discloses the computer system thus has a repository including the external storage device 75 or an external storage device 45 storing a plurality of garment images and the garment images generated by the garment animation image generator 7104 and rendering the animation images of human model wearing a dress or garment in walking by combining the **3D images** of the human model and the **stereoscopic images** of the garment frame by frame **by the Z buffer method** successively outputs the image data to the display device 76 (col. 31, lines

20-67 and column 32, lines 1-65) wherein the images of a plurality of patterns for the stereoscopic images of the garment are 2D images (column 23, lines 60-65).

Volino discloses in Page 10 and Page 17-18 the creation of the human models or the body representations. Volino discloses in Page 14 the garment design and simulation process wherein clothes are animated as deformable objects by assembling 2D panels wherein the garment models are designed as flat fabric panels using a 2D drawing software. The garment panels are used in the 3D simulation process wherein the animation will take place using mechanical simulation and then continuing the simulation on the animated scene and characters and the scene may contain several objects, static or animated, that will interact with the GARMENTS through collision. Volino teaches that garments are loaded from a file containing the description of the 2D panels and the panels are discretized into triangle meshes and then interactively placed in an initial position that is suitable for seaming. When dressing the actor, the initial position is around the actor body. Then, using mechanical simulation, the panels are pulled together along the seaming lines using “elastics” which are attachment forces that pull together the corresponding vertices of both panels along the seaming line. Once the seaming lines are close enough, they are topologically merged, and the set of panels becomes one unique object. Volino discloses complex dressings containing several garments are animated concurrently by the program. Full interaction is provided by collision detection and optimization for multilayer animated objects provides stability of the overall system. Incremental collision detection is also used when relative movements are slow enough. Volino further discloses in Page 14 that the animated garments are finally recorded frame by frame as animations allowing incremental garment design for complex cloth.

Volino discloses a user interface by which a user selects a mannequin (e.g., Page 12 and the interface is disclosed in Page 13; see also Page 17) and one or more garments (Page 14) to be worn by the mannequin (Fig. 10), wherein the mannequin and garments selected may be further defined by specific mannequin and garment parameter values (e.g., Page 12 discloses generating a variety of human shapes; and Page 11 discloses generating human models with different sizes and proportions and five normalized parameters are used to scale the standard skeleton template to accommodate variations in age, sex and race); a repository containing a plurality of two-dimensional garment images and mannequin images as defined by specific parameters (Page 14 discloses that garments are loaded from a file containing the description of the 2D panels and the panels are discretized into triangle meshes and then interactively placed in an initial position that is suitable for seaming);

Volino discloses each two-dimensional garment image in the repository is generated by generating objects corresponding to a representative mannequin and a garment placed in a simulation scene within a three-dimensional modeling environment (Fig. 10). Volino discloses simulating draping and collision (e.g., self-collision, crumpling to the ground of Page 5, stretching and bending deformations of Page 9; bending and wrinkling of Page 8, etc) of the garment with the representative mannequin (Fig. 10) within the simulation scene to generate a three-dimensional rendering frame of the representative mannequin wearing the garment (Page 14; Page 8 also discloses the output is a collection of frames of the computed animation; see Fig. 4); constraining portions of the garment to reside within or outside of one or more shells (Page 17 discloses placing the clothes patterns around the body attaching them by elastic forces) defined around the representative mannequin in the rendering frame (Fig. 10 and Page 8

discloses simulating several garments concurrently with reasonable computation time and numerous and interacting collisions resulting from crumpling or multilayer cloth handled efficiently and robustly wherein the simulation involves the constraints and the collision detection algorithm builds a geometrical surface region hierarchy and takes advantage of surface curvature within and between adjacent surface regions wherein the surface regions around the human model forms the outside shells defined around the representative mannequin as shown in Fig. 10; see Page 9; in Page 14, the 2D panels for the garment models such as flat fabric panels are defined around the representative mannequin or the human model; when dressing an actor, the triangle meshes are placed around the actor body) and a compositing rule interpreter for displaying the two-dimensional images of user-selected garments and of a selected mannequin in a layered order dictated by compositing rules (e.g., the animated garments are recorded frame by frame and can be re-used as input data for subsequent computations allowing for incremental garment design for complex cloth wherein scripts can be organized into specialized libraries for providing tools for setting up materials, fabric types and simulation conditions, etc., the garment simulation process includes the optimization for multilayer animated objects; see Page 14; Page 17 discloses a compositing rule wherein the display entities of different layers may be turned on/off allowing the designer to selectively check the skeleton, primitives, contours and skin envelope simultaneously; Page 14 discloses adding elastics by attaching points within the cloth or between the cloth and other objects and the list of objects in the scene can be added and/or removed interactively with simple buttons; see Page 16; and the next frames are calculated according to the physical model of the scene; see Page 17).

Re claim 44, the limitations of claim 44 are analyzed as discussed with respect to claims 1 and 34 above.

(10) Response to Argument

On Page 17 of Argument, Appellant argues in essence with respect to the claim 1 and similar claims that:

(A) "Appellants do not believe anything in the references cited in the Final Office Action teaches or suggests the subject matter recited by independent claims 1, 16, 19, 29, 32, 34, or 44 as discussed above. It appears to Appellants that the Sakaguchi, Volino et al., and Weaver references deal only with the three-dimensional simulation of a garment worn by a model and, among other things, do not contain teachings that relate to the forming of composite images from pre-rendered two-dimensional garment and mannequin images stored in a repository, to methods of generating two-dimensional garment images that allow different versions to be generated by the use of shells that mimic interaction with other garments, or to applying shape blending techniques to generate rendering frames from previously generated rendering frames."

In response to the arguments in (A), Appellants' argument differ from the claim languages set forth in the claim 1 and thus is irrelevant to the rejection to claim 1. For example, "pre-rendered" can be found nowhere in the claims. The claim 1 recites "<u>a three-dimensional rendering frame of the representative mannequin wearing the garment</u>" rather than "two-

dimensional garment and mannequin images" argued by the Appellants. Appellants failed to provide the proper claim languages, which they may believe as invention.

Nevertheless, Appellant's base claim 1 is broadly construed. Appellant's claim 1 recites the limitation that, "the garment to reside within or outside of one or more shells defined around the representative mannequin ...wherein each shell is a three-dimensional construct designed to mimic the physical interaction of the garment with another garment". This claim limitation recites the broad term of the garment to reside either within or outside of one or more shells defined around the mannequin.

According to Appellants' specification Fig. 6, <u>the skeleton M</u> is surrounded by the shells A-G wherein one or more shells can be included in the cloth or garment. Appellants apparently defined the concept of shells in the Fig. 6 of the Specification. Appellants' claimed shells are nothing more than the outside surfaces surrounding the skeleton (See Appellants' Fig. 6). Moreover, Appellants' claimed shells are no different from the prior art teaching of garment models surrounding the human skeleton. See Volino Fig. 5 wherein the underlying skeleton is surrounded by a plurality of shells including primitives, sample grids, wire-frame and shaded textures as well as multiple layers of clothes. See Sakaguchi Fig. 4 wherein <u>shells D surrounds the mannequin M meeting the claim limitation of "shells" in accordance with the definition set forth in Appellants' Fig 6</u>.

Appellant argues in essence with respect to the claim 1 and similar claims with regards to "each shell is a three-dimensional construct" and "a three-dimensional rendering frame of the representative mannequin wearing the garment" while subsequently the claim redefines a

mannequin to be a two-dimensional image. Appellants failed to establish their own claim invention with the proper claim languages.

Nevertheless, Volino teaches a multilayer cloth in *a geometrical surface region hierarchy* wherein each geometrical surface region (of shells) surrounds the skeleton of Fig. 5 and at least one garment model incorporating the 2D pattern images defined around the human model or defined around the skeleton.

Volino teaches a method for producing an image of a computer-simulated mannequin wearing a garment as defined by selected mannequin (Figs. 10 and 12) and garment parameter values (*Section 4.2 wherein the garment parameter values include elasticity, thickness, density and rigidity*), comprising:

Generating objects corresponding to a representative mannequin (*See Section 3.4 and Fig. 5 wherein objects of organic shapes including primitives, grids, skeleton, wireframes are generated corresponding to a representative mannequin) and a garment placed in a simulation scene within a three-dimensional modeling environment (Fig. 12 wherein Marilyn is dressed and In Section 4.2, it is stated, "Once garment is defined in this way, the mechanical computation may proceed with the animated scene for computing the final animation. At any time, extra "elastics" may be added as attach points within the cloth or between the cloth and other objects, adding new design possibilities. Complex dressings containing several garments are animated concurrently by the program. Full interaction is provided by collision detection, and optimization for multilayer animated objects provides stability of the overall system. Incremental collision detection is also used when relative movements are slow enough...Animated garments are finally recorded frame by frame as animations"*);

Simulating draping and collision of the garment (*See Section 1-Introduction for the folds and drapes and the collision detection of the cloth with the body and with itself*) with the representative mannequin within the simulation scene to generate a three-dimensional rendering frame of the representative mannequin wearing the garment (*See Section 4.2, it is stated, "The 3D simulation process, that basically consist of assembling the garment panels in the context where the animation will take place using mechanical simulation, and then continuing the simulation on the animated scene and characters. The scene may contain several objects, static or animated, that will interact with the garments through collision. In particular, the actor to be dressed is typically an animated object"*);

Constraining portions of the garment to reside within or outside of one or more shells defined around the representative mannequin in the rendering frame during the draping and collision simulation, wherein each shell is a three-dimensional construct designed to mimic the physical interaction of the garment with another garment (*Section 4.3 wherein the garment has the thickness parameter and Section 2.3 wherein the cloth model may interact with the body or other clothes using collision response and attach points. Fig. 10 and Page 8 discloses simulating several garments concurrently with reasonable computation time and numerous and interacting collisions resulting from crumpling or multilayer cloth handled efficiently and robustly wherein the simulation involves the constraints and the collision detection algorithm builds a geometrical surface region hierarchy and takes advantage of surface curvature within and between adjacent surface regions wherein the surface regions around the human model forms the outside shells defined around the representative mannequin*

as shown in Fig. 10; see Page 9; in Page 14, the 2D panels for the garment models such as flat fabric panels are pattern images defined around the representative mannequin or the human model; when dressing an actor, the triangle meshes are placed around the actor body. In the multilayer cloth each layer represents a shell around the multilayer human body as described in Section 3.4 and Fig. 5. Moreover, the garment is also constrained to reside outside of the layered human body model wherein the layered human model and the human skin surfaces represent multiple layers/shells defined around the Skeleton of Fig. 5 wherein the shells are the geometrical surfaces characterized by geometrical surface thickness, static and dynamic friction and bouncing elasticity. *The multilayer cloth in a geometrical surface region hierarchy at least includes a three-dimensional construct designed to mimic the physical interaction of the garment/cloth with another garment/cloth. See Section 5 wherein cloth are handled as independent objects and a cloth model may interact with the body or other clothes using collision response and attach points; see Fig. 12 wherein a dressed Marilyn is simulated in a real environment*); and

Rendering (*See Fig. 10 wherein the 2D cloth panel meshes are rendered on a display*) a two-dimensional image of the garment from the rendering frame (*Fig. 10; see Page 9; in Page 14, the 2D panels for the garment models such as flat fabric panels are pattern images defined around the representative mannequin or the human model; when dressing an actor, <u>the triangle meshes</u> are placed around the actor body; see Section 4.1 and Figs. 3-4 wherein the 2D panel image objects are stored in file formats in an object database or Data Structure and Section 4.2 has the description that garments are loaded from a file containing the description of the 2D panels. These 2D panels are image objects*) and layering the rendered garment image upon a

two-dimensional image of a selected mannequin (*Fig. 10 and Page 8 discloses simulating several garments concurrently with reasonable computation time and numerous and interacting collisions resulting from crumpling or multilayer cloth handled efficiently and robustly wherein the simulation involves the constraints and the collision detection algorithm builds a geometrical surface region hierarchy. Section 4.2-4.3 and Fig. 10 wherein the 2D panel image objects are rendered to show the texture, deformations and to specify the level of shading and the physical parameters such as elasticity, thickness, density and rigidity are specified in a physical simulation of the scene wherein the clothes patterns around the body attaching them by elastic forces. The different layers, i.e., shells, displayed can be turned on/off by interaction with a user through editing the parameters in a controlled simulation and the mannequin are transformed into a two-dimensional image when being displayed on a two-dimensional display device*).

Appellant argues in essence with respect to the claim 1 and similar claims with regards to "each shell is a three-dimensional construct." However, Sakaguchi teaches a garment model incorporating the 2D pattern images defined around the human model.

Sakaguchi at least teaches or suggests the claim limitation wherein each shell is a three-dimensional construct (See Fig. 4 wherein shells D surrounding the mannequin M. See Figs. 7, 11A-11C and 23-24 wherein both the garment and human model are the three-dimensional construct; see Fig. 34 wherein a plurality of shells are constructed around the human model within a plurality of frames and the garment also resides outside the skin surface of the human

body) designed to mimic the physical interaction of the garment with another garment. See Fig. 34 wherein the human model Mst and the garment model Cst are both shells defined around the mannequin and Fig. 34 also shows the draping and collision effect wherein the physical interaction of the garment of the first image frame with another garment of the second image frame has been displayed in the animation simulation and the deformation in the garment Cst caused by the collision of the garment Cst and the human model Mst is simulated. Moreover, each garment Cst includes a plurality of garments or garment patterns of Fig. 2 wherein each garment includes a skirt garment, a front body garment etc, or a two-piece dress garment includes two-piece garments interacting with each other. See also Fig. 11A-11C wherein Fig. 11A shows a human body wearing clothes and Fig. 11c shows putting another layer of garments to the human body of Fig. 11A. See column 7, lines 30-50 wherein the collisions of the patterns D with the human model M and of the collisions of the patterns D with each other (See Fig. 2 wherein a plurality of Patterns D or garments are shown), i.e., the pattern D images constitute the garment images. The pattern D images interact each other and reside inside in the garment model Cst shells or D shells, are detected/simulated. Therefore, Sakaguchi teaches the physical interaction of the garment with another garment or the interaction of a pattern garment with another pattern garment (See Appellants' Fig. 6 wherein the garment patterns may reside within the shells in Fig. 6. However, Sakaguchi at least teaches a plurality of garment patterns reside within the shells D of Fig. 4).

Sakaguchi teaches rendering a two-dimensional image of the garment (See column 23, lines 60-67 wherein the 2D images of a plurality of patterns D' of the special garment C' are disclosed and column 27, lines 65-67 wherein 2D images of the planar patterns D" for the special

garment C' are disclosed and column 23, lines 38-55 discloses an external storage device 45, i.e., a repository, for storing a plurality of the 2D planar pattern images of the garment) from the rendering frame and layering the rendered garment image upon the image of a selected mannequin. For example, at Fig. 34, col. 31, lines 21-55, Sakaguchi teaches that the garment images and the human body image are rendered/displayed in a two-dimensional display screen and the garment image is layered over the human body image selected from a plurality of human body images. See column 27, lines 60-67 wherein the 2D images of the planar patterns are renewably displayed in the display device 62. See also column 23, lines 1-10 wherein the transformation functions are applied to render the frame in a two-dimensional display device and thereby transforming both the garment patterns and the human figure model into the two-dimensional composite image (See Fig. 34). Sakaguchi teaches in column 32, lines 10-20 <u>the Z-buffer method</u> for successively outputs the image data (in layers) to the display device 76 (See also Fig. 4 wherein patterns/shells D surround the mannequin M.

Appellant argues that the references do not contain any teachings that relate to the forming of composite images from pre-rendered two-dimensional garment and mannequin images stored in a repository. However, Sakaguchi clearly shows in Fig. 34 a composite image comprising the human body and the garments. Moreover, Appellant's argument is irrelevant to the claim 1 as the claim does not have the limitation of "pre-rendered" or that mannequin images are stored in a repository.

As discussed above, Volino teaches in Fig. 10 that the 2D cloth panel meshes are rendered on a display and in Fig. 10; Pages 9-14, that the 2D panels for the garment models are pattern images defined around the representative mannequin or the human model; when dressing

an actor, the triangle meshes are placed around the actor body. In Section 4.1 and Figs. 3-4, Volino teaches that the 2D panel image objects are stored in file formats in an object database or Data Structure and Section 4.2 has the description that garments are loaded from a file containing the description of the 2D panels. These 2D panels are image/mesh objects and the human body wearing the garments is composed by a plurality of the 2D panel images. Volino teaches layering the rendered garment images upon the image of a selected mannequin because the image representation of the mannequin is projected to the two-dimensional surface when the image is displayed on a two-dimensional display surface (It is noted that Appellants' claim 1 also recites "to generate a three-dimensional rendering frame of the representative mannequin").

Volino teaches in Fig. 10 and Section 3.2 simulating several garments concurrently with reasonable computation time and numerous interacting collisions resulting from crumpling or multilayer cloth handled efficiently and robustly wherein the simulation involves the constraints and the collision detection algorithm builds a geometrical surface region hierarchy characterized by geometrical surface thickness, static and dynamic friction and bouncing elasticity. In Section 4.2-4.3 and Fig. 10, Volino teaches that the 2D panel image objects are rendered to show the texture, deformations and to specify the level of shading and the physical parameters such as elasticity, thickness, density and rigidity are specified in a physical simulation of the scene wherein the clothes patterns around the body attaching them by elastic forces. The different layers displayed can be turned on/off by interaction with a user through editing the parameters in a controlled simulation.

On Page 18 of Argument, Appellant argues in essence with respect to the claim 1 and similar claims that:

> (B) "As best understood, the cited portion of Sakaguchi deals with the generation of two-dimensional garment patterns suited for an individual client from a three-dimensional simulation of a standard model wearing a standard garment. The described technique deforms the standard garment image in accordance with the positional relationships between the vertices (i.e., lattice points) of the polygons (i.e., triangle patches) making up the standard model and the vertices of the polygons making the standard garment in the simulation before and after changing the dimensions of the mannequin. Appellants do not see what this has to do with the shells as recited in the pending claims. The triangle patches are not a shell defined around the mannequin; They are the polygons that either make up the mannequin or the garment."

In response to the arguments in (B), Appellant's base claim 1 is broadly construed. Appellant's claim 1 recites the limitation that, "the garment to reside within or outside of one or more shells defined around the representative mannequin ...wherein each shell is a three-dimensional construct designed to mimic the physical interaction of the garment with another garment". This claim limitation recites the broad term the garment to reside <u>either within or outside</u> of one or more shells defined around the mannequin.

Sakaguch at least teaches the human body wearing the garment wherein the garment resides outside the shell of the human body. Sakaguchi at least discloses the Z buffer method in column 32 in relation to the collision simulation of Fig. 34 in a plurality of animation image

frames that the human model Mst wearing a dress or garment Cst in walking. The human model Mst or the garment Cst constitutes the one or more shells as claimed. The garment images reside within or outside the human model Mst or the garment Cst as required by the claim.

Moreover, each garment Cst includes a plurality of garments or garment patterns of Fig. 2 wherein each garment includes a skirt garment, a front body garment etc, or a dress garment includes a two-piece garments interacting with each other. See also Fig. 11A-11C wherein Fig. 11A shows a human body wearing clothes and Fig. 11c shows putting another layer of garments to the human body of Fig. 11A. See column 7, lines 30-50 wherein the collisions of the patterns D interact with the human model M and the collisions of the patterns D interact <u>with each other</u>, i.e., the pattern D images constitute the garment images (See Fig. 4 wherein shells D surround the mannequin M). The pattern D images interact each other and reside inside in the garment model Cst shells or D shells or reside outside of the human body shells Mst, are detected/simulated. Therefore, Sakaguchi teaches the claim limitation wherein each shell is a three-dimensional construct designed to mimic the physical interaction of the garment with another garment. Moreover, in Fig. 34, Sakaguch discloses the animation sequence wherein the garment of the next frame is simulated based on the other garments of the previous frames and thus the garment of the next frame interacts with the other garments of the previous frames in the sequence of the animation frames.

On Page 19 of Argument, Appellant argues in essence with respect to the claim 1 and similar claims that:

(C) "Appellants disagree with every assertion made in the quoted statement. Fig. 10 of Volino does not show any kind of shell designed to mimic the interaction of a garment with another garment; it merely shows a simulation scene containing a garment and a model. Page 14 of Volino does not discuss the use of a shell to mimic the effects of a garment and does not discuss the layering a two-dimensional (2D) panels for use in a three-dimensional simulation. These 2D panels are not two-dimensional images, however. Rather, they are two-dimensional surfaces that are embedded in the three-dimensional space of the simulation. As noted previously, Volino contains no teachings that relate to the generation of composite two-dimensional images by layering two-dimensional images upon one another."

In response to arguments in (C), it should be pointed out that the claim invention also recites "a garment placed in a simulation scene within a <u>three-dimensional</u> modeling environment" and "generate <u>a three-dimensional rendering</u> frame of the representative <u>mannequin</u>" in direct contrast with the claim limitation of "<u>a two-dimensional</u> image of a selected <u>mannequin</u>". While the claim 1 has been amended in the process of prosecution, Appellant's claim 1 recites limitations that are contradictory. Appellants failed to provide the proper claim languages and hastened to appeal before the board in light of the prior art teachings of the references. In the analysis to follow, the claim limitations may also be accorded with the broadest reasonable interpretation consistent with appellant's specification.

Appellants are incorrect in asserting that, "these 2D panels are not two-dimensional images". However, the 2D cloth panels of Volino are two-dimensional pattern images. Volino

teaches in Fig. 10 that the 2D cloth panel meshes are rendered on a display and in Fig. 10; Sections 3.1-4.3, that the 2D panels for the garment models are pattern images defined around the representative mannequin or the human model; when dressing an actor, the triangle meshes are placed around the actor body.

In Section 4.1 and Figs. 3-4, Volino teaches that the 2D panel image objects are stored in file formats in an object database or Data Structure and Section 4.2 has the description that garments are loaded from a file containing the description of the 2D panels. These 2D panels are image/mesh objects.

Appellants further argue that Volino contains no teachings that relate to the generation of composite two-dimensional images by layering two-dimensional images upon one another. The examiner respectfully disagrees with the appellants' argument.

Volino teaches layering the rendered garment image upon a two-dimensional image of a selected mannequin because the image representation is projected to the two-dimensional surface when the image is displayed on a two-dimensional display surface. Volino teaches in Fig. 10 and Section 3.2 simulating several garments concurrently with reasonable computation time and numerous and interacting collisions resulting from crumpling or multilayer cloth handled efficiently and robustly wherein the simulation involves constraints. The collision detection algorithm builds a geometrical surface region hierarchy characterized by geometrical surface thickness, static and dynamic friction and bouncing elasticity. In Section 4.2-4.3 and Fig. 10, Volino teaches that the 2D panel image objects are rendered to show the texture, deformations and to specify the level of shading and the physical parameters such as elasticity,

thickness, density and rigidity are specified in a physical simulation of the scene wherein the clothes patterns around the body attaching them by elastic forces. The different layers, i.e., shells, displayed can be turned on/off by interaction with a user through editing the parameters in a controlled simulation.

Appellants further argue that Fig. 10 of Volino does not show any kind of shell designed to mimic the interaction of a garment with another garment. The examiner respectfully disagrees with the appellants' argument. Even with cursory reading of Volino, Volino teaches the physical layers and geometrical surfaces (the one or more shells) surrounding the skeleton or the human body model.

In a non-limiting example, Volino teaches Section 1 composing the cloth and the body surfaces wherein Volino's figures show composite images of garments and the mannequin. Volino teaches in Fig. 10 and Sections 3.2-4.3 simulating several garments concurrently with reasonable computation time and numerous and interacting collisions resulting from crumpling or multilayer cloth handled efficiently and robustly wherein the simulation involves the constraints and the collision detection algorithm builds a geometrical surface region hierarchy characterized by geometrical surface thickness, static and dynamic friction and bouncing elasticity. Volino discloses handling the numerous interacting collisions such as crumpling and multilayer surfaces (Section 2.3). Volino teaches that the skin surface in Fig. 5 and Section 3.4, the geometrical surfaces in the hierarchy for the multilayer cloth that meet the claim limitation of

"one or more shells" as the skin surface and the geometrical surfaces or the multilayer surfaces have organic shapes (Section 3.4) to simulate the collision response of the multilayer animated objects (Section 4.2) wherein the cloth model may interact with the body or other clothes using collision response and attach points (Section 5). The multilayer cloth physically interacts with each other because "elastics" are added as attach points within the cloth or between the cloth and other objects wherein "elastics" are attachment forces that pull together the corresponding vertices of both panels by elastic forces. Therefore, Volino meets the claim limitation of "the garment to reside within or outside of one or more shells defined around the representative mannequin".

Appellants further argue that Volino contains no teachings that relate to the generation of composite two-dimensional images by layering two-dimensional images upon one another. The examiner respectfully disagrees with the appellants' argument. As discussed above, Volino teaches multilayer cloth and the interaction of the multilayer cloth wherein two-dimensional cloth panel images are layered upon one another. Each layer of the cloth is a shell and comprises the two-dimensional cloth panel images overlaying each other and the multilayer cloth and the body surfaces are composed on a two-dimensional display device.

On Page 19 of Argument, Appellant argues in essence with respect to the claim 1 and similar claims that:

(D) "The shells referred to in the claims act as surrogates for other garments in order to allow composite images of multiple garments to be rendered from separate rendering frames each containing only one garment."

In response to the arguments in (D), appellants argue that the shells act as surrogates for other garments. Appellants' claimed shells are not necessarily surrogates for <u>garments as the claim is broadly construed</u>. The skin surfaces are also shells wherein the garments reside outside of the shells as required by the claim 1. Appellants' claim 1 recites a garment to reside outside of a shell such as a skin surface. Appellants' claim 1 is broadly construed and is taught by Volino or Sakaguchi. For example, Volino teaches multilayer clothes (shells) surrounding a skeleton. Volino teaches hierarchical composite surfaces (shells) surrounding a skeleton. Sakaguchi teaches in Fig. 4 patterns/shells D surrounding the mannequin M.

On Page 19 of Argument, Appellant argues in essence with respect to the claim 1 and similar claims that:

(E) "This allows a plurality of different versions of each garment image to be created and stored in a repository so that multiple two-dimensional garment images can be layered on a two-dimensional rendering of a mannequin."

In response to the arguments in (E), it should be pointed out that the claim invention also recites "a garment placed in a simulation scene within a <u>three-dimensional</u> modeling environment" and "generate <u>a three-dimensional rendering</u> frame of the representative

mannequin" in direct contrast with the claim limitation of "rendering...a two-dimensional image of a selected mannequin". While the claim 1 has been amended in the process of prosecution, appellant's claim 1 recites limitations that are contradictory. The claim limitations are accorded with the broadest reasonable interpretation consistent with appellant's specification.

Appellant argues that a plurality of different versions of each garment image to be created and stored in a repository. However, Appellant's argument is irrelevant to the claim 1 as the claim 1 does not have the limitation that images are stored in a repository.

Nevertheless, Volino teaches in Fig. 10 that the 2D cloth panel meshes are rendered on a display and in Fig. 10; Pages 9-14, that the 2D panels for the garment models are pattern images defined around the representative mannequin or the human model; when dressing an actor, the triangle meshes are placed around the actor body. In Section 4.1 and Figs. 3-4, Volino teaches that the 2D panel image objects are stored in file formats in an object database or Data Structure and Section 4.2 has the description that garments are loaded from a file containing the description of the 2D panels. These 2D panels are image/mesh objects.

On Page 20 of Argument, Appellant argues in essence with respect to the claim 16 and similar claims that:

(F) "Appellants, however, assert that animation *per se* is not shape blending. In any case, appellants find no teaching or suggestion in Sakaguchi for employing an animation system to generate a mannequin or garment having different dimensions from a previously generated mannequin or garment as presently claimed by using shape blending a partial draping and collision simulation."

In response to the arguments in (F), the examiner respectfully disagrees with the Appellants' argument. Appellants speculate the term "shape blending", which is vaguely recited for the reasons set forth below. Appellants' shape blending is met by the prior art of records even in view of the Appellants' Specification See Volino Fig. 5 for the layered human model surrounding the skeleton and Sakaguchi column 32, lines 45-65 for the description of shape blending to produce a frame in a sequence of the animation frames).

Appellants argue in essence with respect to the claimed shape blending. Although Specification discloses a form of shape blending through the linear interpolations of the shapes/triangles/primitives of multiple reference frames, claimed shape blending set forth in the claim 16 broadly recites linearly combining parameters of a single first rendering frame ("with the parameters of a second rendering frame" has been omitted and thus the claim language of "combining parameters of a first rendering frame" does not make sense because shape blending is to blend the shapes of two or more frames in which parameters of a first frame is to be combined with parameters of a second frame), which is not even close to the linear interpolation based on two or more reference frames (even if the limitations in Specification has been incorporated into the claim, however linear interpolation based on reference frames is old and well-known in the computer graphics arts). Moreover, the parameters of a first rendering frame are not combined with the parameters of its own rendering frame. Nevertheless, Appellants' claim language <u>deviates</u> substantially from what has been disclosed in Appellants' Specification as Appellants poorly construed the shape blending with respect to a single frame. Although the

claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Sakaguchi teaches in column 30-32 the claimed shape blending in the combination of the garment and the human body by combining the garment animation image and the human animation image (column 30, lines 55-65) and the shapes or the image parts of the second frame in the animation sequence is obtained from combining/adding the shapes or the image parts or parameters of the first frame with the change image or the change image parts or parameters (See column 32, lines 34-47). The change image is calculated for the respective parts including hands, legs, trunk of the human model and the change images or the change patterns of the garment are correspondingly calculated (Fig. 2 and column 32, lines 45-65). Therefore, the shape blending in Sakaguchi allows the linearly adding/combining the parameters of the first rendering frame with the change parts calculated for the second frame by adding the changed parts to the shapes of the first frame to obtain the shapes of the second frame. The garment motion is simulated based on a partial draping and collision simulation for the image parts. Thus, Sakaguchi has taught the claim limitations set forth in the claim 16.

In another non-limiting example, Sakaguchi teaches in Fig. 34 that the animation system is employed to generate a garment interacting the human model Mst or the garments interacting with each other. The garment shown in the second frame around the mannequin has the distinct dimensions from the garment in the first frame of the previously generated mannequin due to the collision interaction during the animation. Even assuming the limitations in the Specification read into the claim, Appellants' claimed shape blending is interpreted as linearly combining parameters of the first rendering frame to perform a partial draping and collision simulations.

However, on the deformable surface animations of Sakaguchi, shape blending is employed to simulate the collision response of the garment interacting with the human body and each of the successive frames in Fig. 34 is simulated using the animation curve of the parameters and the parameters of the second frame linearly depend upon the corresponding parameters of the first frame in the combination of the parameters plus the changed parameters due to animation to provide the shapes for the second frame in the animation sequence of frames (See Fig. 34 and column 32, lines 34-47).

Sakaguchi teaches in column 7, lines 40-67 and column 8, lines 1-40 that collision of the human body with the garment occurs as the human body moves and a force acts to keep the shape of the garment changed by the collision with the human body acts and a collision of the garment with the human body as the garment moves. Sakaguchi teaches the calculation of the movement of the garment by the geometric modeling of the collision of the garment and the human body. Sakaguch discloses that a part of the human body in motion and a part of the garment belonging to the same motor system are corresponded and <u>the part of the garment corresponding to the part of the human body in motion</u> is caused to move in the same manner. Sakaguch thus teaches a partial draping and collision simulation. In view of above, Sakaguchi's specific teaching meets the claim limitation of "shape blending corresponding objects of the first rendering frame" as set forth in the claim 16.

On Page 20 of Argument, Appellant argues in essence with respect to the claim 16 and similar claims that:

(G) "The Final Office Action also points to pages 10-11 of Volino as disclosing shape blending. It appears to Appellants, however, that the discussion at pages 10-11 of Volino relates to the use of different geometric primitives; some primitives may be blended together and others may not. Thus, the cited portion of Volino in no way relates to the shape blending referred to in the pending claims."

In response to the arguments in (G), the examiner respectfully disagrees with the appellants' argument. Appellants' shape blending is met by the prior art of records even in view of the Appellants' Specification See Volino Fig. 5 for the layered human model surrounding the skeleton and Sakaguchi column 32, lines 45-65 for the description of shape blending to produce a frame in a sequence of the animation frames).

Appellants argue in essence with respect to the claimed shape blending. Although Specification discloses a form of shape blending through the linear interpolations of the shapes/triangles/primitives of multiple reference frames, claimed shape blending set forth in the claim 16 broadly recites linearly combining parameters of a single first rendering frame ("with the parameters of a second rendering frame" has been omitted, which is not acceptable. See Appellants' specification wherein shape blending set forth a linear interpolation between the parameters of the rendering frame with the parameters of another frame), which is not even close to the linear interpolation based on two or more reference frames (even if the limitations in Specification has been incorporated into the claim, however the linear interpolation based on reference frames is old and well-known in the computer graphics arts). Nevertheless, Appellants' claim language deviates substantially from what has been disclosed in appellants' Specification.

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In a non-limiting example, Volino teaches in Section 3.2 that the collision response is linear. Volino teaches in Section 3.4 that as the primitives/shapes are moved and deformed the resulting blended surface changes shape in the collision response simulation. Volino teaches in Section 4.2 that the animated garments are finally recorded frame by frame as animations, which can be re-used (as reference frames) as input data for subsequent computations and thereby discloses linearly combining the shapes of the frames as input data for subsequent computations and the next frames are calculated according to the physical model of the scene. Moreover, Volino has taught in Section 4.1 animated objects moved either by an animation sequence or a geometrical transformation and modifying parameters in a linear fashion or manipulating objects wherein the animated sequence is generated in a similar way to Sakaguchi's method in which the collision responses are simulated. In object animation, the shapes or the image parts of the second frame in the animation sequence is obtained from combining the shapes or the image parts of the first frame with the change image or the change image parts. The change image is calculated for the respective image objects including hands, legs, trunk of the human model (Fig. 2). Therefore, the shape blending in animation sequence allows the linearly combining the parameters of the first rendering frame with the change parts calculated for the second frame from the collision responses by adding the changed parts to the shapes of the first frame to obtain the shapes of the second frame. The garment motion is simulated based on a partial draping and

collision simulation for the image parts. Thus, Volino has taught the claim limitations set forth in the claim 16.

On Page 21 of Argument, Appellant argues in essence with respect to the claim 6 and similar claims that:

> (H) "They do not appear to have any teachings that relate to storing two-dimensional images generated via a three-dimensional simulation in a repository, where such stored two-dimensional images are generated so as to be suitable for combining in a composite image by layering...Nor is any teaching found in the references that relates to the stored two-dimensional images being rendered from a plurality of selectable camera angles as recited by claim 42."

In response to the arguments in (H), the examiner respectfully disagrees with the Appellants' argument. Sakaguchi teaches in column 15, lines 50-60 the database server (a repository) for storing the information on the patterns of the garment. Sakaguch teaches in column 23, lines 60-67 the 2D images of a plurality of patterns D' of the special garment C' and in column 27, lines 65-67 the 2D images of the patterns D" for the special garment C'. In column 23, lines 38-55 he discloses an external storage device 45, i.e., a repository, for storing a plurality of the 2D pattern images of the garment. Sakaguchi teaches in Fig. 34, col. 31, lines 21-55 that the garment images and the human body image are rendered/displayed as a 2D composite image in a two-dimensional display screen wherein the garment image is layered over the corresponding parts of the human body image selected from a plurality of human body images.

Appellants argues with respect to claim 42 that Sakaguchi does not teach the stored two-dimensional images being rendered from a plurality of selectable camera angles. The examiner respectfully disagrees with the Appellants' argument. Sakaguchi teaches in column 5, lines 14-20 that the postures of the human model wearing the garment can be stereoscopically viewed from various camera angles. Volino also teaches in Section 4.3 the camera angles that using a spaceball or trackball enables the user to rotate the model or camera around in space for different viewing.

On Page 21 of Argument, Appellant argues in essence with respect to the claim 6 and similar claims that:

> (I) "Appellants further find no teaching or suggestion in the cited references for compositing rules or a compositing interpreter that define in what order specific garment images should be layered to thereby generate a composite two-dimensional image of the mannequin wearing the garments, or of combining images rendered from separate rendering frames containing different garments into a composite two-dimensional image using Z-coordinates of the garments."

In response to the arguments in (I), the examiner respectfully disagrees with the Appellants' argument. Sakaguchi teaches in column 32, lines 10-20 the Z-buffer method for successively outputs the image data (in layers) to the display device 76 (See also Fig. 4 wherein patterns/shells D surround the mannequin M). Therefore, the compositing rules of the image displayed on the display device 76 are in accordance with the Z-buffer method. In response to

arguments in (H), Sakaguchi discloses combining the shapes and/or parameters of the separate rendering frames to generate the animated sequence in Fig. 34 and the composite two-dimensional image on a display device 76 is composed/rendered with the Z-buffer method (See Fig. 4 for the layering of patterns D with mannequin M). Volino teaches in Section 2.2 that clothes are worn on several layers and the scripting algorithm determines the layering order. Volino also mentioned the z-buffer method in Section 1. Using the z-buffer method in image compositing is old and well known in the prior art and does not render the claims allowable.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Conferees:

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Xiao Wu

U Chauhan for Kee Tung.

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